DOCUMENT RESUME

TM 000 642

ED 052 237

AUTHOR	Gephart, William J.
TITLE	The Eight General Research Methodologies: A Facet Analysis of the Research Process.
INSTITUTION	Phi Delta Kappa, Bloomington, Ind.
REPORT NO	Occas-Pap-6
PUB DATE	Jul 69
NOTE	16p.
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	*Classification, *Comparative Analysis, *Educational Research, Evaluation Techniques, Measurement, Research Criteria, *Research Design, *Research Methodology, Research Problems, Statistical Analysis, Statistics
IDENTIFIERS	*Guttman Facet Design Technique

ABSTRACT

There is a need for clarity regarding different research strategies in order to assess the relative contribution of each. Using the framework of the Facet Design Technique (FDT) for problem structuring, eight general research strategies are identified as they relate to measurement fidelity, representativeness of units, and treatment administration. Three forces are seen as having contributed to a system of classifying research methods. They include: development of an instrument for evaluating the methodological adequacy of research in education; a growing reliance on the experimental method; and, the Guttman Facet Design Technique (FDT) which provides a system for the development of a conceptual universe on a specified problem in advance of the generation of empirical data. The historical, descriptive, experimental, and quasi-experimental methods of research are defined in operational terms and classified into eight categories of research strategies through the use of the FDT. Levels of control, profiles of the different methods, and examples of less familiar inquiry techniques are examined. It is concluded that in some instances, data that have specific inadequacies can yield stronger conclusions through the application of certain statistical techniques, but that the overall evaluation of any completed research cannot be concluded until a contrast is made which holds up the statistic used to the statistic most appropriate for the nature of the generated data. (AE)

ED052237

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

PHI DELTA KAPPA

RESEARCH SERVICE CENTER

OCCASIONAL PAPER

#6 THE EIGHT GENERAL RESEARCH METHODOLOGIES: A FACET ANALYSIS OF THE RESEARCH PROCESS

by

William J. Gephart
Director of Research Services
Phi Delta Kappa

July 14, 1969

TM 000 642

ED052237

THE EIGHT GENERAL RESEARCH METHODOLOGIES: A FACET ANALYSIS OF THE RESEARCH PROCESS

by

William J. Gephart
Director of Research Services
Phi Delta Kappa, Bloomington, Indiana, U.S.A.

Three forces have contributed to the system for classifying research methods described in this paper. First, for several years the author has been working on the development of an instrument for evaluating the methodological adequacy of research in education. Throughout this effort assertions have been made that one instrument cannot be expected to fairly evaluate the different research methodologies. Historical research, descriptive research, and experimental research are different entities according to these critics. Are they different, or are they facets of a single entity--the inquiry method? Until this is established, the question of the need for one or a variety of research evaluation instruments cannot be resolved.

The second force is the growing concern for reliance on the experimental method. This concern is expressed by Guba in his discussion of the changing concept of research. He says,

> It appears there are two problems with the experimental approach: (1) it is not always possible or desireable to maintain the degree of control required by the laboratory-oriented experimental approach in a real-life setting, such as represented by the school, and (2) data from experiments do not answer all questions that might be asked. (1)*

Debate on this topic has much emotional content. This writter has heard

---

*Throughout this paper, references will be identified by their number on the References page.

dogmatic assertions to the effect that if experimentation is not present, research is not being done; that if an hypothesis is not being tested, the work is inconsequential. The responses from the rebuffed advocates of historical and descriptive research are equally dogmatic. Again, until the similarities and differences of the several methodologies can be sorted, the argument cannot move off the emotional dead center of personal preference.

Aligned with this concern is the confusion that is exhibited in the literature about research methods. Typically, this term has referred to the three general strategies: historical, descriptive, and experimental. In recent years a fourth method, the quasi-experiment, has been introduced by Campbell and Stanley, (2) and a fifth suggested, the aexperimental method described by Guba (3). Even with the acceptance of these additions, some general inquiry approaches are left unclassified. For example, consider the case study approach, certainly not an experiment, perhaps somewhat a cross between a descriptive and a historical method.

The third force leading to the eight method categorization presented here is the Facet Design technique developed by Guttman and described by Runkel (4). Guttman's work provides a system for the development of a conceptual universe on a specified problem in advance of the generation of empirical data. Runkel's discussion of his work shows how Facet Design can be used to conceptualize about the elements (facets) of a complex area before starting the empirical study, and how such an effort can improve subsequent investigations. This author and a colleague, Bruce Bartos, used this technique to provide a structure for research methods through which the eight general methods were identified.

Before proceeding with the discussion of the use of Facet Design in

the delineation of the eight general methods, it seems necessary to differentiate between the term "method" and the term "technique." The two are used interchangeably for two different meanings. At times they refer to the general research strategy, and at other times they mean the specific things done in a research project. This paper focuses on general research strategies and will use the term "method" in the belief that it is the broader of the two terms. Method in the discussion that follows will encompass techniques as the latter is used here to refer to specific things done in the generation and analysis of data.

THE APPLICATION OF FACET DESIGN TO INQUIRY METHODS

Runkel indicates that the activities involved in Facet Design are:

1. The selection of elements known or suspected to comprise the problem area under scrutiny.
2. The precise definition of those elements.
3. The examination of those elements for common aspects (called facets).
4. The determination of the levels of those common aspects that can be seen in the problem. (Where possible these levels should be conceptual scales.)
5. Listing the universe of profiles that exist through all possible combinations of the facet levels.
6. Determination of the relationships among the universe of profiles.

Each of these activities is illustrated as applied to inquiry strategy, and then the eight general methods will be discussed.

Inquiry Methods Currently Described in the Literature and Their Definitions

As Indicated earlier the literature on the research process refers

to four general methods. These were selected for the starting point in the inquiry facet design. They are presented below, first with definitions taken from recognized texts on the research process.

1. HISTORICAL METHOD--". . . involves a procedure supplementary to observation, a process by which the historian seeks to test the truthfulness of the reports of observations made by others. Both the historian and scientist examine data, formulate hypotheses, and test the hypotheses against the evidence until acceptable conclusions can be drawn." (5)
2. DESCRIPTIVE METHOD--". . . describes and interprets what is. It is concerned with conditions or relationships that exist; practices that prevail; beliefs, points of view, or attitudes that are held; processes that are going on; effects that are being felt; or trends that are developing." (6)
3. EXPERIMENTAL METHOD--". . . a scientific investigation in which an investigator manipulates and controls one or more independent variables and observes the dependent variable or variables for variation concomitant to the manipulation of the independent variables." (7)
4. QUASI-EXPERIMENTAL METHOD--"If the experimenter cannot or does not assign his experimental units at random to his experimental treatments, he performs other than a "true" experiment. . . . Intermediate between the frankly associational study and the experiment is a wide area called by Campbell quasi-experimentation. . . . he does not have full manipulative control of his experimental units." (8)

Although these definitions are from recognized and reputable sources,

they lack a precise delineation of the aspects of each method, a delineation necessary for Facet Design. After much discussion and consultation of the literature the following set of definitions evolved:

1. HISTORICAL METHOD--is the determination of truth about events, developments, and conditions of the past. It uses as measurements observations recorded by others to interpret what happened to whom or what. It involves the establishment of the population which experienced a set of events and the delineation of the nature of the experience.
2. DESCRIPTIVE METHOD--is the determination of the manner in which a population is distributed on a variable or variables, and/or the degree of association among variables. It uses measures designed to validly and reliably collect the data. It focuses on a specific sample and/or population because of things that may or may not have happened to them.
3. EXPERIMENTAL METHOD--is the determination of the cause and effect relationship among two or more variables. It involves the administration of specified treatments to a population or a sample of a population and the valid and reliable measure of the effects of the treatment.
4. QUASI-EXPERIMENTAL METHOD--is the estimation of the cause and effect relationship among two or more variables in natural settings. It involves the administration of specified treatments to an unselected group and the valid and reliable measure of the effects of the treatment.

Facets of Inquiry: the Common But Variable Elements of the Definitions

The third activity in a facet analysis is the examination of the

definitions for common yet variable aspects. On the four definitions three items are common but variable, a population or a sample thereof, measurement, and treatment. The historian is concerned about who or what is included in the phenomenon he studies. He has to establish the nature of the group on which he has obtained valid records and the nature of the population represented by this sample. The descriptive researcher, in his objective of depicting, has to ascertain the boundaries of the population he studies and the degree to which those on which he has measures represent this population. The experimenter must also be concerned about the population and sample representativeness, for generalizations about cause and effect require a population referent. The quasi-experimenter is no less concerned about a population. Granted, he works in an arena in which he is denied direct control over representativeness. But he works in a natural setting because he wants to know about the effects of variables in that setting. Therefore, his inability to representatively select a sample and assign it to a treatment are not evidences of a lack of concern, but rather of his concern for reality.

Similarly, the four methods involve treatments. This is an obvious factor in the experiment and the quasi-experiment. Although less obvious, it is a part of the historical and descriptive methods. The historian is either interested in determining the nature of a treatment experienced by a group or in the effects of a treatment. The descriptive method focuses on a group for a reason. They have an apparently common set of experiences (treatment) which make them an interesting group for description. For example, descriptive studies have been done on the vocabulary possessed by children at various grade levels. We are interested in these children and their vocabulary levels for two reasons: we expect to administer instructive

treatments to them, and we feel sure that prior to the time they are studied they experienced things that affected their vocabulary. Despite our inability to describe these sets of events, they constitute treatments.

Measurement is an obvious facet of descriptive, experimental, and quasi-experimental methods. In each case the investigator either selects an established means of measuring that will develop the required data, or he designs measures that will do the job. The historian is not so fortunate. He must use records made by others. Part of his task is the establishment of the credence of the recording source. A statement that a situation existed, made and recorded in the past, becomes his measurement. He must through a variety of means corroborate the validity and reliability of that statement. In so doing he evidences concern for measurement fidelity.

Given the acceptance of these statements, three facets are clear: representativeness of the units studied, content of the treatment experienced, and measurement fidelity. Are there other items common to the four method definitions? Yes, each one either clearly states or implies that it is an effort to learn something. This is not considered as a facet, however, as it is a constant in all methods, rather than something that exists at different levels.

Facet Variation: A Determination of Levels

The next activity in the facet design technique is the determination of the levels of the various facets. In this, both Guttman and Runkel clearly display the advantage of looking for levels that are at least conceptual scales. They also imply that the levels might be determined by further examination of the definitions which serve as a basis for the analysis. As we reexamine the definitions, it is apparent that the descriptive and experimental methods are such that the investigator controls the

representativeness of the units studied. On the other hand, the quasi-experimentalist and the historian do not have initial control. In both of the latter cases, the selection of the units on which records have or are to be made is determined by someone other than the investigator. Thus there are at least two levels to this facet, under and not under the investigator's control.

There is a scale underlying these levels. If the item is under his control, the investigator can be expected to produce greater strength of conclusion. If it is not in his control, conclusions must be tempered with the possibility that undisclosed uniquenesses may cause the studied units to be different from the population in general. Thus, the level of this facet under-the-investigator's-control is of greater strength than is the level not-under-control.

The same pair of levels exists in the measurement fidelity and treatment facets. On the former, measurement fidelity facet, the historian lacks control. He uses observations recorded by others as his measures. The three other methodologies are instances in which the investigator decides what and how records should be made. On the treatment facet, the historian and descriptive researcher are in a non-control situation. They deal with units that have experienced a treatment, the elements of which the investigator cannot describe with surety. The experimenter and the quasi-experimenter, on the other hand, carefully structure the experience of the units studied to enable as strong as possible a statement about the relationship between treatment and consequence. (9) In both of these sets of levels the non-control case conceptually seems less productive of truth about an unknown than does the control. Thus, we have three facets, each of which can be analyzed into two levels, controlled or not controlled by the investigator.

The Universe of Profiles

Such an analysis enables us to return to the original set of known elements and profile them, part of the fifth step in Facet Design as stated by Runkel and Guttman. Profiling is accomplished by assigning numerical values to the levels of the identified facets. In the case in point, non-control is represented by the subscript 1 and control by 2. The historical method is an investigatory approach in which neither the measurement, representativeness, nor treatment are under the control of the researcher. He uses records made by others and kept on a sample that he was unable to select originally as evidence of a treatment that he did not administer. Thus, the profile for the historical method is m_1, r_1, t_1.

Descriptive methodology is profiled as m_2, r_2, t_1, since the researcher here has control over selection and measurement but not over treatment. Experimental method can be represented as m_2, r_2, t_2, as the investigator in this strategy has control over all three facets. The quasi-experimental method--since it is a strategy designed for those instances that do not permit the investigator control over the representativeness of his sample--would be profiled as m_2, r_1, t_2. The table below indicates these profiles.

Facets and Levels

Research Method	Measurement Fidelity	Representativeness of Units	Treatment Administration
Historical	m_1	r_1	t_1
Descriptive	m_2	r_2	t_1
Quasi-experimental	m_2	r_1	t_2
Experimental	m_2	r_2	t_2

An examination of these profiles leads to the conclusion that there are four types of profile sets. One set has all control level facet notation (the experimental method m_2, r_2, t_2). Another has all non-control level facet notation (historical method m_1, r_1, t_1). Between these extremes is a

set that has two facets at the control level and one non-control (descriptive and quasi-experimental methods). The profiles for these two are m_2, r_2, t_1 and m_2, r_1, t_2 respectively. There is a third possible profile that becomes discernable in this set, m_1, r_2, t_2. This would be a strategy that involves careful control over treatment and representativeness facets in a situation that does not permit control over measurement. Such a study might be labeled an unobtrusive-measurement-experiment.

Having described three profile sets (all 1's, all 2's, and two 2's and a 1) the fourth set becomes apparent. These profiles would be research strategies for situations in which it is possible for the investigator to exercise control over one of the facets but not over the other two. The profiles for such cases would be the three combinations of a 2 and two 1's (m_2, r_1, t_1; m_1, r_2, t_1; and m_1, r_1, t_2). This brings us to a total of eight profiles, all that possibly could exist if a system consists of three facets each with two levels. In effect this system is a 2 x 2 x 2 matrix which yields a total of eight separate categories. The table below lists the complete set, indicates the level of control on each of the three facets, and where possible supplies a descriptive name for the strategy. The material following the table will present briefs of studies that serve as illustrations of the heretofore unfamiliar strategies.

Facets and Levels of Control

Research Method	Measurement Fidelity	Representativeness of Units	Treatment Administration
A. Historical	m_1	r_1	t_1
B.	m_2	r_1	t_1
C. Case Study	m_1	r_2	t_1
D.	m_1	r_1	t_2
E. Descriptive	m_2	r_2	t_1
F. Quasi-experiment	m_2	r_1	t_2
G. Unobstrusive-measure experiment	m_1	r_2	t_2
H. Experiment	m_2	r_2	t_2

EXAMPLES OF THE LESS FAMILAR INQUIRY PROFILES

In the interest of conservation of space the audience is asked to supply examples of historical, descriptive, quasi-experimental, and experimental research. Profile B (m_2, r_1, t_1) in which the investigator has control over measurement fidelity but not over the representativeness of the units studied or the treatment administration, is illustrated in an account of a study proposed by a professor as a cooperative dissertation for several doctoral students. The problem indicated an interest in determining the impact of higher education institutions on their urban surroundings. Impact in this case was defined as financial contribution and social attitudes and behaviors. Clearly, the investigator cannot control the treatment in this case. The college or university exists in the community and in varying and perhaps amorphous ways has an impact. The investigator has in reality a two-part task; he must determine what the higher education institution does and the impact of those actions. Further, if the things done by the institution are not known in advance, it is impossible to enumerate those to whom these things are done. Therefore, the researcher cannot assert that he has control over representativeness of units.
As plans for this study have progressed, a nomination technique is being employed to define the population. That is, logically involved individuals are identified and interviewed. Persons mentioned in certain contexts in these interviews are to be added to the list of units studied and will by extrapolation define the population. Such a study has definite weaknesses; it can, however, be rigorously conducted and yield evidence on which to base future hypothesizing. There are individuals who will question the worth of the effort described above. Such individuals would perfer the comfort of the controlled experiment and by implication

at least would defer any study until the facets of the investigation could be under control. If they succeed in such a demand, advancement of knowledge in areas such as this will be delayed for a long time.

Research method C (m_1, r_2, t_1) has been labeled in the table as a Case Study methodology. It represents a situation in which the total population is involved, a situation which should mean that control over the representativeness of the units studied is in the hands of the investigator. If a case study is being made of me, I am the best unit to study to insure that the study will yield sound conclusions about me. However, if you are going to conduct that case study, you have to use measures recorded by others and perhaps for other purposes. Finally, in your study of me, you must admit that you have no control over nor can you even describe the complex of treatments that have contributed to what I am. Again there are individuals who would reject this as a valid research effort. We can learn from systematic case studies of individuals and institutions. Frequently such efforts facilitate the advancement of an individual or institution. Note here, there is no claim for broad generalizability of the findings of a case study. The results are of value and reliable for the unit studied, not for some general population.

Method D (m_1, r_1, t_2) can be illustrated by reference to the reaction studies shown in the popular television program, Candid Camera. One program showed films taken of people in elevators. In each one there was one subject and a number of other elevator passengers working with the investigator. When the elevator stopped at a floor to pick up a passenger, all of the others faced the rear of the car. A film was made through which the reactions of the unsuspecting passenger was to be displayed. In such a study subjects are chosen quite by accident, thus not under the

investigator's control. The measurement, a film record of the overt behavior, is an instance of taking what got recorded as the data. Numerous individuals failed to react overtly, thus making their segments of the film unusable as an entertainment medium. This does not say that they did not react. If such a study had been devised to examine reactions to group press, logic would dictate that a simple visual record would miss much of the effect. Thus, it is maintained that the case in point was one in which control over the fidelity of measurement was lacking. Treatment was controlled. In every case the cohorts of the investigator applied the group pressure. Is a study that lacks measurement and representativeness control of value? It would seem to be extremely so as a means of identifying some of the dependent variables operating in an unexplored area.

The last method to be described by an example is one in which the representativeness and treatment facets are controlled by the investigator but the measurement occurs outside of his control (m_1, r_2, t_2). Some of the research on reading instruction has asserted an interest in the degree to which children enjoy reading after receiving instruction in one manner or another. As an index of the enjoyment variable, library loan frequency has been suggested. In such a case the investigator has the possibility of control over sample selection and assignment and over the administration of the treatment, instructional methods. But, the data are generated by the library staff. The number of books checked out by the subjects in the study may or may not be an index of the degree to which the students enjoy reading as a result of the instruction they experienced. The substitution of a self-report on the degree of enjoyment has similar inadequacies, as again the investigator takes what the subject records.

SUMMARY

Before summarizing it seems important to highlight the fact that this system, developed through the application of facet analysis to the inquiry process, does not contain a focus on the analytic techniques that must be applied to the generated data. It is recognized that in some instances data that have specific inadequacies can yield stronger conclusions through the application of certain statistical techniques. The evaluation of any completed research cannot be concluded until a contrast is made which holds up the statistic used to the statistic most appropriate for the nature of the generated data.

This paper has asserted that clarity about the nature of various research strategies is necessary before we can assess their relative contributions. Through describing the facet design technique for problem structuring, eight general research strategies are identified. The uncommon strategies were illustrated by examples.

REFERENCES

1. Guba, Egon G., "The expanding concept of research." Theory Into Practice. VI: 57-65; April 1967. p. 60.

2. Campbell, Donald T., & Stanley, Julian C., "Experimental and Quasi-Experimental Designs for Research on Teaching." in N. L. Gage, Ed. Handbook of Research on Teaching. Chicago: Rand McNally 1963.

3. Guba, Egon G., "Methodological Strategies for Educational Change." ERIC Document Number ED 011 404. November 1965.

4. Runkel, Philip, "Some Recent Ideas in Research Methodology." ERIC Document Number ED 010 221. 1965

5. Travers, Robert M. W., An Introduction to Educational Research: Second Edition. New York: The Macmillan Company, 1964, p. 183.

6. Best, John W., Research in Education. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1959. p. 102.

7. Kerlinger, Fred N., Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc. 1964. p. 290.

8. Stanley, Julian C., "Quasi-Experimentation." The School Review 73:197-205; 1965. p. 198.

9. In another publication Gephart and Bartos have described numerous levels that exist on each of these three facets. Example: The Representativeness of Units facet ranges from perfect-representation-of-a-specified-population to a collection-of-units-were-studied and we know nothing about the sample they represent. Between these two extremes are samples that were volunteers, purposive sampling, and randomly selected subjects. The two extremes were used in the present paper for the considerations in facet design. For the expanded treatment see the final report on Cooperative Research Project Number 071018. Training Materials for Researchers, Developers, and Diffusers. (In progress, 1969.)